Atty. Dkt. No. 039153-0450 (G1155)

REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

In the specification, paragraphs [0001] and [0014] have been amended. Figure 5 has been amended. Claims 12 and 17 have been amended.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1-24 remain pending in this application.

On page 2 of the Office Action, the Examiner objected to the disclosure. The specification has been amended to provide information related to related applications, applications and to correct minor typographical errors. Figure 5 has been amended in accordance with the Examiner's suggestion. No new matter is added in the amendments to Figure 5 the specification, or claims 12 and 17. Withdrawal of the objection to the disclosure is respectfully requested.

On page 2 of the Office Action, claims 1-24 under 35 U.S.C. Section 102(b) as anticipated by U.S. Patent No. 6,057,063 (Liebmann), the Examiner states:

> The claimed invention is directed to a method of designing a phase shifting mask.... The applicant states that the pattern polylines that are away from the active regions are usually laid out with similar design rules as that tha [sic] of the pattern polylines on active regions. And as such there can be many transitions between the phase shifted patterning and binary patterning....

> Liebmann, et al.. (See also Figures 3-6) teach a process of creating a dark field alternating phase shift mask, comprising steps of: identifying features in the mask that require phase shifting; creating generic phase regions on opposite sides of the features that require phase shifting; assigning phases to said generic phase regions utilizing a net coloring approach and base minimum space between features; ensuring proper phase termination of all phase regions; and preparing design data levels from mask manufacturing by applying mask process, specific overlaps and expansions. Liebmann, et al. also teaches that generic phase regions may initially be formed by expanding, or projecting, edges of critical dimension features into polygons. This helps to ensure that every critical dimension feature has a phase region on either side of it. The "coloring" as described below in greater detail, then creates the "phase transition" or phase change across the critical dimension features....

Applicants respectfully traverse the rejection.

Independent Claims 1, 12, 17 and 22 recite a process or mask that involves edges proximate a critical poly region and edges that are not associated with the critical poly region. The edges that are not associated with the critical poly region are expanded or enhanced to form a phase region boundary. Claim 1 specifically recites:

> identifying edges of a ... first phase region being located proximate a critical poly region and the identified edges not being edges of the first phase region adjacent to the critical poly region;
>
> ... expanding the identified edges to define a narrow line ...; and
>
> forming a phase region boundary in the narrow line.

Similarly, Claim 12 explicitly recites:

> defining critical gate areas including critical gate area edges; creating phase areas on either side of the critical gate areas, the phase areas having first edges, the first edges being different than the critical gate area edges;

> ... and constructing a boundary region along the first edges to form a phase region boundary.

Claim 17 explicitly recites:

> the first phase areas and second phase areas as being adjacent to a critical poly region; defining first edges of the assigned phase areas, the first edges being edges of the critical poly region; ... establishing a first boundary around added edges of the first phase area, the added edge as being different as the first edges....

Claim 22 explicitly recites:

> A critical poly section defined by first edges ...; a first chrome boundary region located outside second edges; and a second chrome boundary region ... the second edges of the phase zero region being different than the first edges of the phase zero region.

Therefore, each of the independent claims 1, 12, 17 and 22 specifically recites the formation of boundaries along edges which are not critical edges.

In direct contrast to the principles of the present invention, Liebmann does not disclose providing boundaries on the non-critical edges. Indeed, it appears as though generic regions are provided on critical edge areas in direct contrast to the principles of the present invention. As the Examiner noted, Liebmann even states that generic phase regions may initially be formed by expanding, or projecting, edges of critical dimension features into polygons. See, Liebmann, Column 7, lines 13-15. Accordingly, Liebmann does not show each and every element of the present invention and claims independent claim 1 and its dependent claims 2-11, independent claim 12 and its dependent claims 13-16, independent claim 17 and its dependent claims 18-21, and independent claim 22 and its dependent claims 23-24 are not anticipated by Liebmann.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

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The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

Date Dec 3, 2003

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Version with Markings to Show Changes Made

12. (Currently amended) A method of generating phase shifting patterns to improve the patterning of gates and other layers needing sub-nominal dimensions, the method comprising:

defining critical gate areas including critical gate area edges;

creating phase areas on either side of the critical gate areas, the phase areas having first edges, the first edges being different than the critical gate area edges;

assigning opposite phase polarities to the phase areas on either side of the critical gate areas;

enhancing phase areas with assigned phase polarities;

defining break regions where phase transitions are likely to occur;

generating polygons to define other edges and excluding the defined break regions; and

constructing a boundary region along the first edges to form a phase region boundary ~~outside of phase 0 regions to form a phase shift border~~.

17. (Currently amended) A method of enhancing clear field phase shift masks with a chrome border around outside edges of phase 0 and phase 180 regions, the method comprising:

assigning phase polarities to phase areas, the phase areas including the first phase areas and second phase areas;

defining first edges of the assigned phase areas, the first edges being edges of a critical poly region;

establishing a first boundary around ~~the defined~~ added edges of the first phase area, the added edges being different than the first edges;

forming a chrome border in the first boundary around the first phase area;

establishing a second boundary around the added edges of the second phase area; and

forming a phase shift border in the second boundary around the second phase area.